tect's drawing of a wrought-iron lock in Beddington Manor House. Both were made for the purpose of record; the differences are surprising, and the superiority of the photograph is obvious at a glance, and still more so on a detailed examination.

Those who have not considered the matter would be surprised at the variety of subjects that are dealt with. The following is a table of the "main classes" given, each of which is to be interpreted very broadly:—Topography, art, literature, geology, palæontology, zoology, botany, horticulture and agriculture, architecture, antiquities, meteorology, passing events; and space is left for other classes.

Although the work is as yet only in its early stages, about fifty thousand photographs have been deposited and catalogued for reference in various public libraries and museums. The authors give as complete details as they have been able to obtain of the extent of the work which has already been done and is now going forward, with the methods adopted in various places for classifying and storing the records, and many valuable suggestions as to ways of popularising the work (for so far it has been done almost entirely by amateurs as a labour of love). They treat also of those little differences in manipulation that add much to the value of the record and little, if anything, to the trouble of making it, such as the indication of the scale of the photograph, the time of day, etc.

We recommend a study of the volume not only to those who are already interested in record work, but to photographers in general, whether professional or amateur. C. J.

OUR BOOKSHELF.

Fertilizers. By the late Prof. E. B. Voorhees. Revised edition by Prof. J. H. Voorhees. Pp. xv+365. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1916.) Price 6*s.* 6*d.* net.

THE first edition of this book was issued in 1898; since then it has been reprinted no fewer than sixteen times, and now it is revised by Prof. J. H. Voorhees and re-issued. The second edition is rather larger than the first, but not much, the subject-matter having been left very much as it was before, with a few additions to bring the book up to date. Thus, some illustrations have been added which increase the interest of the book, and a new chapter has been put in on farmyard manure and green manuring.

The treatment is general rather than special, and only few references to original papers or bulletins are given. We think this ought to be remedied; even an elementary student ought to be put into touch with the sources from which the information presented to him is derived. Modern books show an increasing tendency in this direction, which, of course, is wholly good.

Some of the newer work is not dealt with as one would like, the treatment of the new synthetic nitrogenous fertilisers, calcium cyanamide and calcium nitrate, being very brief. Further, the only mineral phosphates described are those of the United States; no mention is made of such important substances as Gafsa phosphate or Algerian phosphate. In the chapter on farmyard manure, also, we note that gypsum, rock phosphate, kainit, and acid phosphate are all recommended as conserving agents, although many experiments have shown that their action is very small.

One other point ought to be remedied: the factors for converting nitrogen into ammonia, etc., are given to four places of decimals; two are usually sufficient, and more than three are never wanted.

The book retains its distinguishing features and will no doubt prove helpful to the type of student who used the previous edition.

Australia. By Prof. J. W. Gregory. Pp. 156. (Cambridge: At the University Press, 1916.) Price 1*s.* 3*d.* net.

AUSTRALIA is sometimes represented as a fringe of inhabitable land round a useless desert, with a stagnant population, an easily exhausted soil, a national debt of more than 60*l.* a head—in sum, as a country tending to inevitable bankruptcy under the incompetent rule of envious demagogues. Such is the view of Australia which Prof. J. W. Gregory has found little difficulty in proving untenable in this small book. Within its limited compass he has provided considerable information; for example, in the case of Western Australia he shows that the rainier half of that State has already been settled by pastoralists, and contains a rich cattle-breeding country; again, in a convincing chapter on the Government of Australia, he shows that the Labour Party in Australia is misunderstood in Britain, and is led by capable statesmen. With reference to the policy of "White Australia," it is demonstrated that the employment of white labour to displace the Kanakas—one of the most daring of all Australian industrial experiments—has resulted in considerable progress in the cultivation of sugar-canes in Queensland.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.]*

The Aurora, Magnetic Storm, and Sun-spot of January 4.

THE Aurora Borealis of January 4, 1917, described by Mr. Denning and Dr. Rambaut in NATURE of January 18, was also observed by Mr. Alfred Noël Neate, at Carlisle. He has kindly sent me the following description of the display:—"I observed a very great display of aurora on Thursday evening, January 4. The principal display was observed by me at about 10.45 p.m., but I had seen a lesser one at 5.45 p.m. Notwithstanding the advanced phase of the moon, the whole northern half of the hemisphere

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was affected by it, and had the moon been absent the sight would have been truly magnificent. As it was, great beams shot up vertically and horizontally, the latter forming great arches, and the former appearing like searchlights. Frequently an immense area of the sky would become illuminated as if by a great cloud of mist, and the light would pass up to the zenith with lightning rapidity, appearing like clouds of light being wafted upwards from the N. horizon. The clouds were mostly greenish, like a gas-mantle, but the background of the sky was pale ruby."

The magnetic storm of considerable violence which accompanied this auroral display affected the magnets between the hours January 4, 3.36 p.m., and January 5, 2.48 a.m., G.M.T. The greatest range in declination was 57′, in horizontal force 50′, and in vertical force 52′, where in force $1'=4\cdot6\ \gamma$ ($\gamma=10^{-5}$ C.G.S. unit). Mr. Neate mentions 5.45 p.m. as the hour of a lesser display, and Mr. Denning 8.30 p.m. as the time of the appearance of an auroral streamer. Both these times approximately were marked by rapid oscillations in all three elements. The ranges were, in the first instance, declination 40·4′, horizontal force 40·2′, and vertical force 19·6′, and, in the second instance, 40·0′, 29·7′, and 10·5′ respectively. Dr. Rambaut gives the hour 10.15 p.m. for the finest display of streamers, and Mr. Neate the hour 10.45 p.m. This period was also marked by a series of oscillations on the three curves, but not so rapid or of such large amplitude as the former ones.

On December 30, 1916, a very large round spot of regular outline was glimpsed through clouds near the E. limb of the sun. On January 4, when it was about 13° to the west of the central meridian, it had the appearance of an elongated spot with considerable penumbra and two nuclei, followed by two smaller spots. Another group of two large spots about the same distance east of the central meridian followed it on almost the same parallel of latitude. A small round spot was also near the W. limb. These spots, in the northern hemisphere, were all the spots visible on that date. The area of the large spot was 9 units, in terms of the 1/5000 of the visible disc, and its position was: latitude +14°, and longitude 136°, heliographic. It was a new outburst, though contiguous to a region which had been disturbed as late as October 19, 1916. By January 6 the main spot had split into two, and the surrounding area showed much activity. On January 9, when it was near the W. limb of the sun, there was a whole series of groups of small spots, almost on the same parallel of latitude, stretching from the W. to the E. limb of the sun. In addition to the large group, which, though born on the invisible hemisphere of the sun, was active between January 4 and 6, the subsequent appearance of no fewer than five groups of small spots, three of which were new formations, was further evidence of a disturbed condition of the solar surface. On January 24 extensive and bright faculæ marked the position of the large spot on the sun's E. limb.

A. L. CORTIE, S.J.

Stonyhurst College Observatory,
January 25.

Forms of Weathering in Magnesian Limestone.

SEVERAL distinct forms of weathering are met with in the Sunderland Magnesian Limestone, two of which I will describe, leaving two others for another occasion. In one of them the prevailing rod, or the retiform, structure has been altered into one closely resembling a coral, *e.g. Lithostrotion basaltiforme.* Many of the short columns, consisting chiefly of calcium carbonate, have now numerous thin bands across their long axis (shown by arrow), producing the coral-like appearance, due, I suppose, to rearrangement in a periodic series of the carbonate of lime molecules. They have a fairly uniform thickness of about 1/30 of an inch, with slightly less interspaces. Thus far I have only met with this structure in this unique concretionary limestone, where it has been exposed several years.

The specimen shown in Fig. 1 was cut off a pinnacle 6 in. long and 2 in. thick, which was removed from the top of a "wall" of rock, this, at the base, is about 10 ft. thick, with a section, on the north side, of about 10 ft., and on the other side 20 ft., from the respective ground-levels. It is situated on the northern boundary of Old Southwick Quarry on Carley Hill, a part of Fulwell Hill.

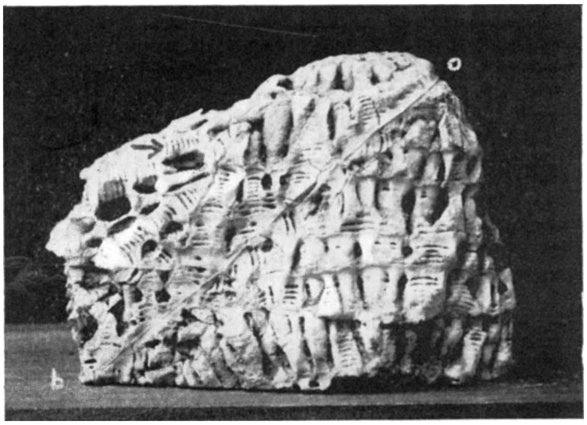

FIG. 1.—Weathered Magnesian Limestone, Carley Hill (natural size).

Thicker bands are seen in this figure; the diagonal one, *b.o*, is what I term a "band of origin," from which the rods grew. Others, at right angles to the rods, are part of the original "honeycomb" structure. Apparently a few rods remain unaltered, but closer observation reveals the same zones, although not distinguishable in the photograph.

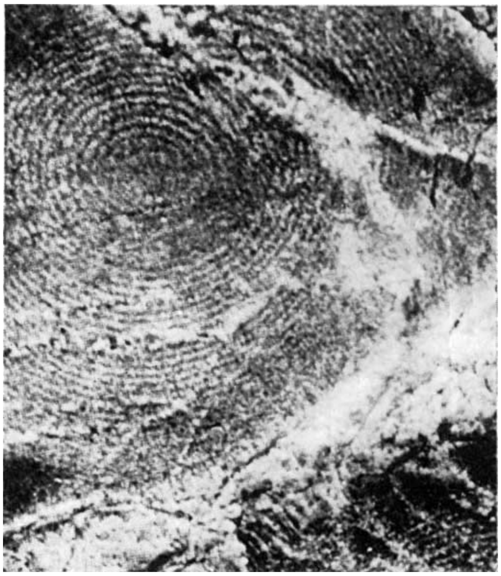

FIG. 2.—Segregation banding in Cannon-ball Bed, Roker, 1901 (×1·5).

Fig. 2 represents part of a vertical surface on a southern face of the Cannon-ball Bed, where it juts

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